AutoML:
Model Search & AutoML Tables (Google)

Will Moore

Automated Machine Learning

- Looking to address the whole pipeline of ML
  - Pre-processing
  - Feature Engineering, Extraction, Selection
  - Transfer learning
  - Algorithm/model selection
  - Hyperparameter optimization
  - Leakage detection
  - Analysis
  - UI
  - Visualization

Neural Architecture Search (NAS)

- Subfield of AutoML
- Automates the design of NNs
- Models for NAS defined by
  - ***Search space*** : definition of the type of NN to be designed and optimized
  - ***Search strategy*** : the approach for exploration of the search space
  - ***Performance estimation strategy*** : Evaluation of a possible NN from its design (without instantiating or training it)

- Example:
  - Reinforcement Learning (RL) based NAS
    - Better-than-manual results, computationally expensive

AutoML Tables

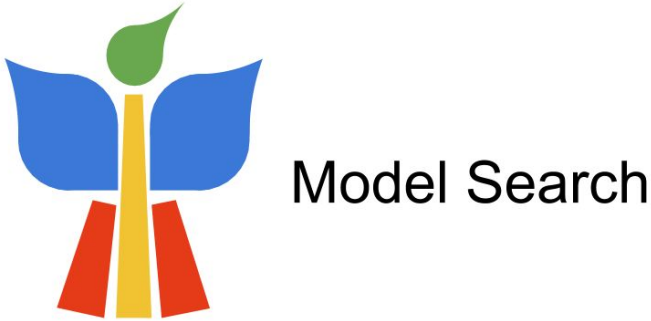
- (Beta) available on Google Cloud Platform

- Structured data portion of AutoML on AI Platform

Model Search

- Google open source released Model Search on February 19, 2021

- Model Search is built on TensorFlow, uses Phoenix NAS.



Model Search

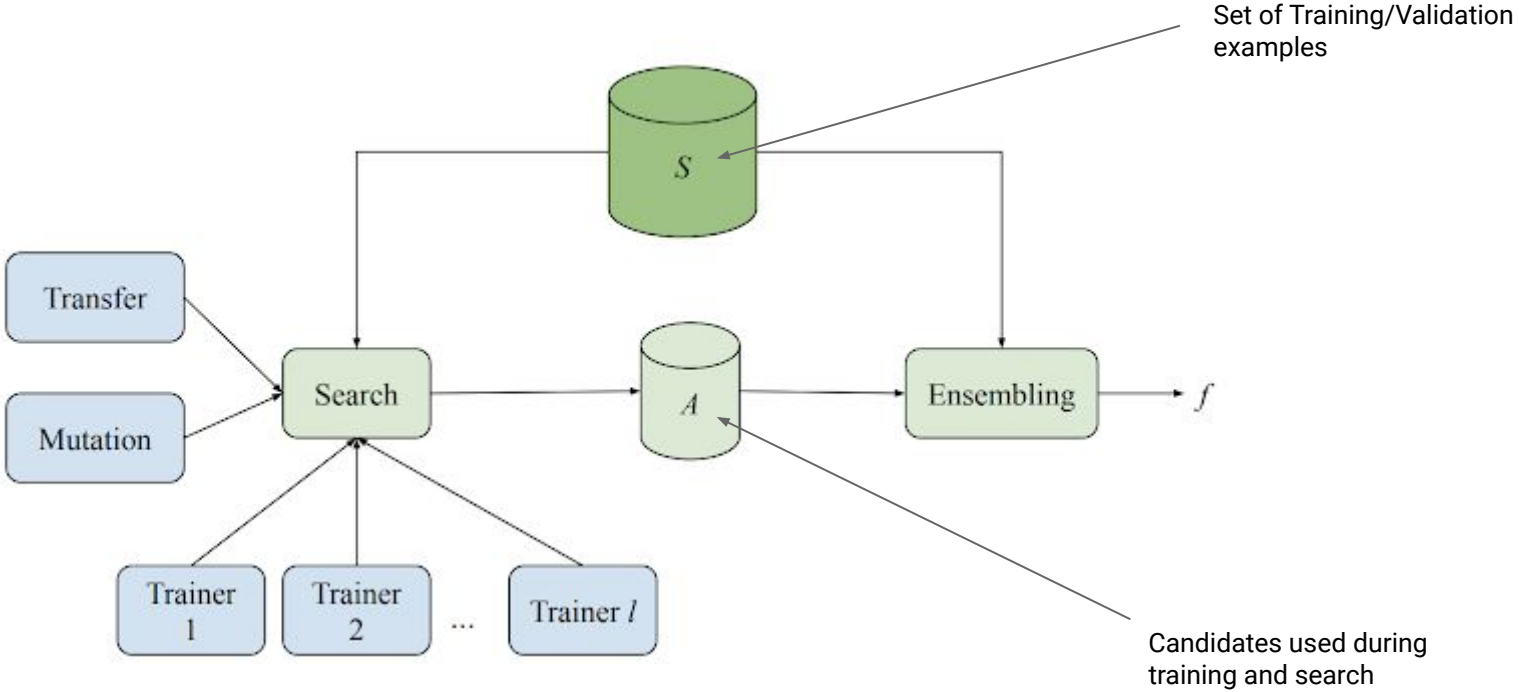
- Domain agnostic
  - NLP or Computer Vision applicability

- Currently only classification models
  - Potentially regression in the future

Model Search Has 4 Components

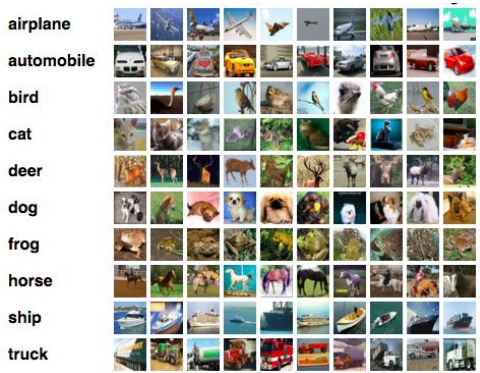
- Model Trainers
- Search Algorithms
- Transfer Learning Algorithm
- Model Database

Model Search Schematic



Model Search Performance

Model Search beat Google's own production model for keyword spotting and language identification using 41.6% fewer trainable parameters. (184k v. 315k)



91.83% accuracy on the CIFAR-10 dataset:

NasNet algorithm (RL) - 5807 trials

PNAS (RL + Progressive) - 1160 trials

Model Search - 209 trials

Model Search Constraints

- Like AutoML Tables, you can use CSV files
- Correct formatting is important
- A few tricky details

Let’s look at the notebook

Final Thought

- Curious to see Model Search performance on images

Thanks for your attention

Visit:

https://ai.googleblog.com/2021/02/introducing-model-search-open-source.html

https://github.com/google/model_search